REMARKS

In the Office Action dated February 12, 2003, claims 1-9 are pending. The Examiner has issued a restriction requirement for one of groups I and II. In response, Applicants elect group I of claims 1-8 without traverse, but reserve the right to recover the un-elected claims in a divisional or continuation application.

The Examiner rejects the elected claims 1-8 under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,440,648 of Roberts, et al. (the '648 patent). In response, Applicants amend claims 1 and 7 to more clearly claim the invention, amend claim 8 for antecedent basis corrections, and add new claims 10-14 drawn to a web inspection system of the elected group. Applicants assert that claims 1-8 and 10-14 are patentable over the cited prior art as discussed below.

I. Summary of the Present Invention

The present invention identifies the flaws in the smart camera, and sends the flaw image data and the location of the flaw on the web to the computer. *The computer is not used to detect flaws.* As shown in Figures 6A and 6B of the present invention, the smart camera generates digital line scan data 340 that is transmitted to a multi-pipeline flaw detection pre-processor 310 within the smart camera. The pre-processor includes a background filter 350, a machine direction streak filter 352, a cross direction streak filter 354 and a small flaw filter 356 that process the incoming corrected pixel line scan data 340. Each two dimensional filter 350, 352, 354, 356 utilizes the corrected pixel data 340 to calculate running averages along a length and width of the web. The averages 400, 404, 406, 408 become references for good product for regions local to each average. Adaptive background subtraction channels 372,374,376,378 operate on the outputs of the filters by subtracting a portion 402 of the background filtered signal 400 from the corrected signal 340, the machine direction streak filtered signal 406, the cross direction streak filtered signal 404, and the small flaw filtered signal 408. The

outputs of the adaptive background subtraction channels 372,374,376,378 are coupled to multi-group thresholders 358, 360, 362, 364, 368. The multi-group thresholder detectors 358, 360, 362, 364, 368 supply a plurality of video streams that may contain flaws and defects to priority logic 370. The priority logic 370 is utilized to apply thresholds and rules to the video streams 380, 382, 384, 386, 388 to identify potential flaws. The potential flaws are processed through additional detectors and analyzers, including an inspect/reject criteria analyzer, to generate the flaw image and location information that is transmitted to the computer 332.

II. Contrasts Between the '648 Patent and the Present Invention

The '648 patent of Roberts, et al., neither teaches nor suggests the use of a smart camera for generating flaw image data and flaw location data as claimed in the claims of the present invention. In the '648 patent, each sensor output represents a unique section, that is, portion of a line of pixels, of the image (see column 5, lines 36-38). Specifically, and as stated in Column 4, lines 11-15 of the '648 patent, "[t]he cameras 30 themselves analyze the video signals generated from the viewed images to detect defects and produce data on each defect and its relative X-position or coordinate, that is, relative position from one side edge of the section viewed by each camera." The data is further explained as individual defect pixel values and their X-coordinates, in Column 6, line 65-68. Continuing with column 6, lines 68 through column 7, lines 1-4, "[t]he stored defect pixel data is subsequently read out of the FIFO's by the computer interface circuit (CIC), FIG2., and transferred to the corresponding secondary processing unit for further analysis."

Processing of data outside of the camera is disclosed in column 4, lines 15-21 which states that "[e]lectrical cables 34 connect the cameras 30 to a multiplexer and interface unit 38 which combines the defect data for each transverse image line of the web 20 detected by all the cameras and then suitably passes the defect data over a cable 40 to an image processing unit 42 in a central computer 46."

Therefore, the cameras of the '648 patent output pixel data and location of the pixel for a single line of pixels. It is then up to the processing unit 42 - outside of the camera - to process the information. In stark contrast, the smart camera of the present invention performs all flaw processing within the camera including complex blob analysis and generation of two dimensional location data including the defect area, width, height, MD (machine direction) location and CD (cross direction) location.

The processing of the pixels in the '648 camera is not comparable to the processing of the camera of the present invention. Specifically, the camera of the '648 patent subtracts the current pixel from background pixel and compares the result to a threshold to determine if pixel is a defect pixel (See Figure 4 of the '648 patent). The '648 camera updates the background pixel if the current pixel is within acceptable range. The new background pixel value is derived from at least one prior pixel value. This allows the system to follow gradual changes in the video signal. This solution works for materials that are homogenous like film, glass etc. For these materials the grayscale variation in the web is small (no high frequencies). However, this scheme will fail for materials that are porous, or for materials that have very large grayscale variations e.g. wire mesh, non-wovens, textiles, etc.

In contrast, the smart cameras of the present invention utilizes five matched filters that run in parallel. The largest filter, e.g. a 512 x 512 pixel filter, is used as a background filter, and all other smaller filters, e.g., 4 x4 pixel filters, are subtracted from the background filter. The result of the subtraction is compared to a threshold to determine if a pixel is a defect pixel. Since the background filter is so large, it is not necessary to discriminate between a normal pixel and a defect pixel when calculating the background pixel value as is done in the '648 patent. The background filter automatically tracks gradual changes in the video signal. This solution works for non-homogenous materials, such as wire mesh and non-wovens, and defects which are almost the same shade of gray as the background can be

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detected.

III. Response to Rejection Under 35 U.S.C. 102(b)

The Examiner rejects the elected claims 1-8 under 35 U.S.C. 102(b) as being anticipated by the '648 patent. To anticipate a claim under 35 U.S.C. sections 102(a), (b), or (e), the reference must teach every element of the claim. (See MPEP 2131.) "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." (Emphasis added) (Verdegaal Bros. v. Union Oil Co. of California; see also MPEP 2131.) "The identical invention must be shown in as compete detail as is contained in the ... claim." (Richardson v. Suzuki Motor Co., 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989); see also MPEP 2131.) Further, any claim depending from base claims not anticipated by the prior art also are not anticipated by the prior art since the dependent claims comprise all of the elements of the base claims.

The '648 patent does not teach each and every element of independent claims 1, 7, and 10, as discussed below. Thus, Applicants respectfully request that the Examiner withdraw the 35 U.S.C. 102(b) rejections of the independent claims 1, 7, and 10, and dependent claims 2-6, 8, and 11-14 and issue a notice of allowance for claims 1-8 and 10-14.

a. Independent claim 1, and dependent claims 2-6

In the Office Action, the Examiner asserts that the '648 patent teaches a smart camera which generates flaw image data. Applicants respectfully disagree since, as explained above, the flaw image is produces outside of the camera of the '648 patent. However, Applicants have amended the claim for clarity. Specifically, claim 1 comprises, inter alia,

> a plurality of smart cameras for generating a digital pixel representation of a
> portion of the web, each smart camera for detecting the plurality of

web flaws from the digital pixel representation and for generating
output data comprising a digitized image of each flaw of the plurality
of web flaws and for generating flaw location data for each flaw of the
plurality of web flaws".

The '648 patent does not teach this element of a smart camera for generating
output data comprising a digitized image of each flaw. Rather, as explained above,
the '648 patent teaches outputting pixel data and location in a single "X' direction
for analysis by a processor outside of the camera. Therefore, this reference
teaches away from the present invention. The present invention, as claimed in the
above element, generates output data of a digitized image of each flaw in the
camera. Thus, the '648 patent does not anticipate claim 1, and dependent claims
2-6, since each and every element of claim 1 is not taught by this reference.

Regarding dependent claim 2, the Examiner state that the '648 patent
teaches a multi-pipeline pre-processor "12". However, Applicants cannot locate this
reference designator. Further, column 6, line 30 utilizes the term "pipelining",
however, Applicants assert that their multi-pipeline flaw detection pre-processor 310
as disclosed in the specification, is not anticipated by the "pipelining" of signals
through delays of the '648 patent. Applicants further assert that the defect detection
circuit (66) is not comparable to Applicants' blob detector. Applicants cannot locate
reference designator (16) that the Examiner asserts is the same as Applicants'
inspect/reject analyzer. Thus, the '648 patent does not anticipate claim 2.

Regarding dependent claim 3, the Examiner states that the '648 patent
teaches a plurality of filters for averaging the corrected pixel representation
disclosed in column 8, lines 19+. Applicant's assert that the filters briefly mentions
in column 8, lines 25-24 does not anticipate the specific filters claimed by applicant.
Similarly, the Examiners states that the '648 patent teaches a plurality of adaptive
background subtraction channels. However, Applicant asserts that the "subtract"
block 100 of Figure 4 of the '648 patent does not anticipate any of the adaptive
background subtraction channels of their invention. Further, the computer interface

circuit (70) of the '648 patent is not comparable to the priority logic circuit of the present invention. Thus, the '648 patent does not anticipate claim 3.

Regarding dependent claims 4, 5 and 6, the Examiner merely generally states that the '648 patent teaches the claimed invention. However, Applicant's respectfully disagree as the Examiner has not shown any specific devices of the '648 patent that are comparable to <u>each</u> of the claimed elements. Thus, the '648 patent does not anticipate claims 4-6.

b. Independent claim 7, and dependent claim 8

The '648 patent does not teach each and every element of independent claim 7. Specifically, claim 7 comprises, among other things,

> "providing at least one smart camera for detecting at least one flaw on the web, wherein detecting the at least one flaw on the web comprises the steps of;
> generating flaw image data of the at least one flaw, the flaw image data comprising an area of pixels having a length and a width".

The '648 patent does not disclose at least one smart camera which generates flaw image data comprising an area of pixels having a length and a width. Specifically, the '648 camera outputs individual defect pixel values and an "x" coordinate to the host computer for further processing. In contrast, as claimed in claim 7, at least one smart camera transmits the entire flaw image data having a length and a width to the computer. Regarding dependent claim 8, the Examiner generally states that each element of the claim is anticipated by the '648 patent. However, Applicant's respectfully disagree as the Examiner has not shown any specific devices of the '648 patent that are comparable to <u>each</u> of the claimed elements. Thus, the '648 patent does not anticipate claim 7, and dependent claim 8, since each and every element of claim 7 is not taught by this reference.

c. Independent claim 10

Similarly, the '648 patent does not teach each and every element of new independent claim 10 and dependent claims 11-14. Specifically, the '648 patent does not teach or suggest the filters and the detectors claimed in independent claim 10 as discussed above. Thus, claims 10-14 are patentable over the cited prior art.
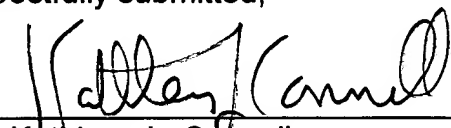
III. Conclusion

For a reference to anticipate a claim under 35 U.S.C. 102(b), the reference must teach <u>each and every element</u> of the claim. The '648 patent is cited by the Examiner in the 35 U.S.C. 102(b) rejection of elected claims 1-8. However, the '648 patent does not teach or suggest each and every element of these claims. Thus, Applicants respectfully request the Examiner to withdraw the rejections under 35 U.S.C. 102(b) and issue a notice of allowance for all of the claims as well as new claims 10-14.

Should the Examiner believe that prosecution of this application might be expedited by further discussion of the issues, he is invited to telephone the attorney for Applicants at the telephone number listed below.

Respectfully submitted,

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By: _____

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